Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL QUALITY MEASURES CLEARINGHOUSE

General

Title

Chronic obstructive pulmonary disease (COPD): hospital 30-day, all-cause, unplanned risk-standardized readmission rate (RSRR) following acute exacerbation of COPD hospitalization.

Source(s)

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 112 p.

Measure Domain

Primary Measure Domain

Related Health Care Delivery Measures: Use of Services

Secondary Measure Domain

Does not apply to this measure

Brief Abstract

Description

This measure estimates a hospital-level 30-day risk-standardized readmission rate (RSRR) for patients discharged from the hospital with either a principal discharge diagnosis of chronic obstructive pulmonary disease (COPD) or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation. The outcome is defined as unplanned readmission for any cause within 30 days of the discharge date for the index admission. A specified set of planned readmissions do not count as readmissions.

The Centers for Medicare & Medicaid Services (CMS) annually reports the measure for individuals who are 65 years and older and are Medicare Fee-for-Service (FFS) beneficiaries hospitalized in non-federal short-term acute care hospitals (including Indian Health Services hospitals) and critical access hospitals.

Rationale

Chronic obstructive pulmonary disease (COPD) is a priority area for outcomes measure development because it is a common, debilitating condition associated with considerable morbidity and mortality. To better assess hospital care and care transitions for COPD patients, the Centers for Medicare & Medicaid Services (CMS) has contracted with Yale New Haven Health Services Corporation/Center for Outcomes Research and Evaluation (YNHHSC/CORE) to develop a hospital-level readmission measure for patients hospitalized with an acute exacerbation of COPD.

Hospital readmission is an important outcome for patients, as it is disruptive to patients and caregivers, costly to the healthcare system, and puts patients at additional risk of hospital-acquired infections and complications. Research has shown that readmission rates are influenced by the quality of inpatient and outpatient care, as well as hospital system characteristics, such as the bed capacity of the local healthcare system (Fisher et al., 1994). In addition, specific hospital processes such as discharge planning (Sharma et al., 2011), medication reconciliation, and coordination of outpatient care have been shown to affect readmission rates (Nelson, Maruish, & Axler, 2000).

Outcome measures can focus attention on a broad set of healthcare activities that affect patients' well-being. Moreover, improving patient outcomes is the ultimate goal of quality improvement, so outcomes are a direct measure of success in quality improvement.

Measuring and reporting readmission rates will inform healthcare providers about opportunities to improve care, strengthen incentives for quality improvement, and ultimately improve the quality of care received by Medicare patients. Improvements in care transitions for this condition are likely to reduce costly readmissions.

Evidence for Rationale

Fisher ES, Wennberg JE, Stukel TA, Sharp SM. Hospital readmission rates for cohorts of Medicare beneficiaries in Boston and New Haven. N Engl J Med. 1994 Oct 13;331(15):989-95. PubMed

Nelson EA, Maruish ME, Axler JL. Effects of discharge planning and compliance with outpatient appointments on readmission rates. Psychiatr Serv. 2000 Jul;51(7):885-9. PubMed

Sharma G, Kuo YF, Freeman JL, Zhang DD, Goodwin JS. Outpatient follow-up visit and 30-day emergency department visit and readmission in patients hospitalized for chronic obstructive pulmonary disease. Arch Intern Med. 2011 Oct 11;170(18):1664-70. PubMed

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research & Evaluation (CORE). Hospital-level 30-day readmission following admission for an acute exacerbation of chronic obstructive pulmonary disease: measure methodology report. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2011 Sep 29. 46 p. [21 references]

Primary Health Components

Chronic obstructive pulmonary disease (COPD); 30-day readmission rate

Denominator Description

The measure cohort consists of admissions for Medicare Fee-for-Service (FFS) beneficiaries aged 65 years and older and discharged from non-federal acute care hospitals and critical access hospitals, having a principal discharge diagnosis of chronic obstructive pulmonary disease (COPD) or a principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted"

readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the denominator is the number of readmissions expected based on the nation's performance with that hospital's case-mix.

See the related "Denominator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Numerator Description

The measure assesses unplanned readmissions to an acute care hospital, from any cause, within 30 days from the date of discharge from an index chronic obstructive pulmonary disease (COPD) admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case-mix.

See the related "Numerator Inclusions/Exclusions" field.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the measure cohort.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Evidence Supporting the Measure

Type of Evidence Supporting the Criterion of Quality for the Measure

One or more research studies published in a National Library of Medicine (NLM) indexed, peer-reviewed journal

Additional Information Supporting Need for the Measure

In 2007, the Medicare Payment Advisory Committee (MedPAC) published a report to Congress in which it identified the seven conditions associated with the most costly potentially preventable readmissions. Among these seven, chronic obstructive pulmonary disease (COPD) ranked fourth (MedPAC, 2007). COPD is a leading cause of readmissions to the hospital (Jencks et al., 2009). The 30-day readmission rate among patients hospitalized for COPD, from 2003 to 2004, is 22.6%, accounting for 4% of all 30-day readmissions (Jencks et al., 2009).

The Agency for Health Research and Quality (AHRQ) has also identified COPD as an ambulatory-care-sensitive condition (ACSC). ACSCs are conditions for which good outpatient care can potentially prevent the need for hospitalization or for which early intervention can prevent complications or more severe disease (AHRQ, 2007). COPD is an ASCS that is associated with high readmission rates and high costs to Medicare (MedPAC, 2007). These facts underscore the need for developing strategies to reduce readmissions and subsequent costs associated with COPD admissions. COPD patients require ongoing care and treatment after discharge and are therefore at increased risk for readmission.

Although many current hospital interventions are known to decrease the risk of readmission within 30 days of hospital discharge (Leppin et al., 2014; Benbassat & Taragin, 2000; Naylor et al., 1999; Coleman et al., 2006), current process-based performance measures, cannot capture all the ways that care within

the hospital might influence outcomes. Measurement of patient outcomes allows for a comprehensive view of quality of care that reflects complex aspects of care, such as communication between providers and coordinated transitions to the outpatient environment. These aspects are critical to patient outcomes, and are broader than what can be captured by individual process-of-care measures.

The COPD hospital-specific, risk-standardized readmission rate (RSRR) measure is thus intended to inform quality-of-care improvement efforts, as individual process-based performance measures cannot encompass all the complex and critical aspects of care within a hospital that contribute to patient outcomes. As a result, many stakeholders, including patient organizations, are interested in outcomes measures that allow patients and providers to assess relative outcomes performance for hospitals (Krumholz et al., 2007). Improvement in inpatient care and care transitions for this common, costly condition are likely to reduce costly readmissions.

Early experience with care bundles suggests that that appropriate (guideline recommended care), high-quality, and timely treatment for COPD patients can reduce the risk of readmission within 30 days of hospital discharge (Hopkinson et al., 2012). Studies of integrated care management after hospitals discharge have suggested clinical benefit (Casas et al., 2006; Prieto-Centurion et al., 2014). Recent evidence of declining readmission rates provides further support for the concept that efforts to improve transitional care can affect a patient's risk of readmission.

Evidence for Additional Information Supporting Need for the Measure

Agency for Healthcare Research and Quality (AHRQ). AHRQ quality indicators. Guide to prevention quality indicators: hospital admission for ambulatory care sensitive conditions [version 3.1]. Rockville (MD): Agency for Healthcare Research and Quality (AHRQ); 2007 Mar 12. 59 p. (AHRQ Pub; no. 02-R0203).

Benbassat J, Taragin M. Hospital readmissions as a measure of quality of health care: advantages and limitations. Arch Intern Med. 2000 Apr 24;160(8):1074-81. PubMed

Casas A, Troosters T, Garcia-Aymerich J, Roca J, HernÃindez C, Alonso A, del Pozo F, de Toledo P, AntÃ³ JM, RodrÃguez-RoisÃn R, Decramer M. Integrated care prevents hospitalisations for exacerbations in COPD patients. Eur Respir J. 2006 Jul;28(1):123-30. PubMed

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Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. N Engl J Med. 2009 Apr 2;360(14):1418-28. PubMed

Krumholz HM, Normand SL, Spertus JA, Shahian DM, Bradley EH. Measuring performance for treating heart attacks and heart failure: the case for outcomes measurement. Health Aff (Millwood). 2007 Jan-Feb;26(1):75-85. PubMed

Leppin AL, Gionfriddo MR, Kessler M, Brito JP, Mair FS, Gallacher K, Wang Z, Erwin PJ, Sylvester T, Boehmer K, Ting HH, Murad MH, Shippee ND, Montori VM. Preventing 30-day hospital readmissions: a systematic review and meta-analysis of randomized trials. JAMA Intern Med. 2014 Jul;174(7):1095-107. PubMed

Medicare Payment Advisory Commission (MedPAC). Report to the Congress: promoting greater efficiency in Medicare. Washington (DC): Medicare Payment Advisory Commission (MedPAC); 2007 Jun. 277 p.

Naylor MD, Brooten D, Campbell R, Jacobsen BS, Mezey MD, Pauly MV, Schwartz JS. Comprehensive discharge planning and home follow-up of hospitalized elders: a randomized clinical trial. JAMA. 1999 Feb 17;281(7):613-20. PubMed

Prieto-Centurion V, Markos MA, Ramey NI, Gussin HA, Nyenhuis SM, Joo MJ, Prasad B, Bracken N, Didomenico R, Godwin PO, Jaffe HA, Kalhan R, Pickard AS, Pittendrigh BR, Schatz B, Sullivan JL, Thomashow BM, Williams MV, Krishnan JA. Interventions to reduce rehospitalizations after chronic obstructive pulmonary disease exacerbations. A systematic review. Ann Am Thorac Soc. 2014 Mar;11(3):417-24. PubMed

Extent of Measure Testing

Assessment of Updated Models

The chronic obstructive pulmonary disease (COPD) readmission measure estimates hospital-specific 30-day all-cause risk-standardized readmission rates (RSRRs) using a hierarchical logistic regression model. Refer to Section 2 in the original measure documentation for a summary of the measure methodology and model risk-adjustment variables. Refer to prior methodology and technical reports for further details.

The Centers for Medicare & Medicaid Services (CMS) evaluated and validated the performance of the models using July 2013 to June 2016 data for the 2017 reporting period. They also evaluated the stability of the risk-adjustment model over the three-year measurement period by examining the model variable frequencies, model coefficients, and the performance of the risk-adjustment model in each year.

CMS assessed logistic regression model performance in terms of discriminant ability for each year of data and for the three-year combined period. They computed two summary statistics to assess model performance: the predictive ability and the area under the receiver operating characteristic (ROC) curve (c-statistic). CMS also computed between-hospital variance for each year of data and for the three-year combined period. If there were no systematic differences between hospitals, the between-hospital variance would be zero.

The results of these analyses are presented in Section 4.3 of the original measure documentation.

COPD Readmission 2017 Model Results

Frequency of COPD Model Variables

CMS examined the change in the frequencies of clinical and demographic variables. Frequencies of model variables were stable over the measurement period. The largest changes in the frequencies (those greater than 2% absolute change) include increases in Anxiety disorders (6.1% to 8.2%), Cardio-respiratory failure and shock (39.5% to 44.4%), Other psychiatric disorders (33.0% to 35.6%), and Renal failure (33.2% to 35.3%).

COPD Model Parameters and Performance

Table 4.3.2 in the original measure documentation shows hierarchical logistic regression model variable coefficients by individual year and for the combined three-year dataset. Table 4.3.3 in the original measure documentation shows the risk-adjusted odds ratios (ORs) and 95% confidence intervals for the COPD readmission model by individual year and for the combined three-year dataset. Overall, the variable effect sizes were relatively constant across years. In addition, model performance was stable over the three-year time period; the c-statistic remained constant at 0.64.

Refer to the original measure documentation for additional information.

Evidence for Extent of Measure Testing

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific measures updates and specifications report: hospital-level 30-day risk-standardized readmission measures. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017 Mar. 112 p.

State of Use of the Measure

State of Use

Current routine use

Current Use

not defined yet

Application of the Measure in its Current Use

Measurement Setting

Hospital Inpatient

Professionals Involved in Delivery of Health Services

not defined yet

Least Aggregated Level of Services Delivery Addressed

Single Health Care Delivery or Public Health Organizations

Statement of Acceptable Minimum Sample Size

Does not apply to this measure

Target Population Age

Age greater than or equal to 65 years

Target Population Gender

Either male or female

National Strategy for Quality Improvement in Health Care

National Quality Strategy Priority

Institute of Medicine (IOM) National Health Care Quality Report Categories

IOM Care Need

Not within an IOM Care Need

IOM Domain

Not within an IOM Domain

Data Collection for the Measure

Case Finding Period

Discharges July 1, 2013 through June 30, 2016

Denominator Sampling Frame

Patients associated with provider

Denominator (Index) Event or Characteristic

Clinical Condition

Institutionalization

Patient/Individual (Consumer) Characteristic

Denominator Time Window

not defined yet

Denominator Inclusions/Exclusions

Inclusions
An *index admission* is the hospitalization to which the readmission outcome is attributed and includes admissions for patients:

Having a principal discharge diagnosis of chronic obstructive pulmonary disease (COPD) or principal discharge diagnosis of respiratory failure with a secondary diagnosis of COPD with exacerbation*
Enrolled in Medicare Fee-for-Service (FFS) Part A and Part B for the 12 months prior to the date of admission, and enrolled in Part A during the index admission
Aged 65 or over
Discharged alive from a non-federal short-term acute care hospital
Not transferred to another acute care facility

*International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) codes used to define the COPD cohort for discharges on or after October 1, 2015:

J41.8 Mixed simple and mucopurulent chronic bronchitis
J42 Unspecified chronic bronchitis
J43.0 Unilateral pulmonary emphysema (MacLeod's syndrome)
J43.1 Panlobular emphysema
J43.2 Centrilobular emphysema
J43.8 Other emphysema
J43.9 Emphysema, unspecified
J44.0 Chronic obstructive pulmonary disease with acute lower respiratory infection
J44.1 Chronic obstructive pulmonary disease with (acute) exacerbation
J44.9 Chronic obstructive pulmonary disease, unspecified

Principal discharge diagnosis codes included in cohort if combined with a secondary diagnosis of J44.0 or J44.1:

J96.00 Acute respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.01 Acute respiratory failure with hypoxia
J96.02 Acute respiratory failure with hypercapnia
J96.20 Acute and chronic respiratory failure, unspecified whether with hypoxia or hypercapnia
J96.21 Acute and chronic respiratory failure with hypoxia
J96.22 Acute and chronic respiratory failure with hypercapnia
J96.90 Respiratory failure, unspecified, unspecified whether with hypoxia or hypercapnia
J96.91 Respiratory failure, unspecified with hypoxia
J96.92 Respiratory failure, unspecified with hypercapnia
R09.2 Respiratory arrest

Note: International Classification of Diseases, Ninth Revision (ICD-9) code lists for discharges prior to October 1, 2015 can be found in the *2016 Condition-specific Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures* .

Exclusions

Without at least 30 days of post-discharge enrollment in Medicare FFS
Discharged against medical advice
COPD admissions within 30 days of discharge from a prior COPD index admission

Exclusions/Exceptions

not defined yet

Numerator Inclusions/Exclusions

Inclusions
The measure assesses unplanned readmissions to an acute care hospital, from any cause, within 30 days from the date of discharge from an index chronic obstructive pulmonary disease (COPD) admission.

If a patient has more than one unplanned admission within 30 days of discharge from the index admission, only the first is considered a readmission. The measures assess a dichotomous yes or no outcome of whether each admitted patient has any unplanned readmission within 30 days. If the first readmission after discharge is planned, any subsequent unplanned readmission is not considered in the outcome for that index admission because the unplanned readmission could be related to care provided during the intervening planned readmission rather than during the index admission.

The risk-standardized readmission rate (RSRR) is calculated as the ratio of the number of "predicted" readmissions to the number of "expected" readmissions at a given hospital, multiplied by the national observed readmission rate. For each hospital, the numerator of the ratio is the number of readmissions within 30 days predicted based on the hospital's performance with its observed case-mix.

Note: This outcome measure does not have a traditional numerator and denominator like a core process measure; thus, this field is used to define the outcome.

See the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-level 30-day Risk-standardized Readmission Measures* for more details.

Exclusions
Admissions identified as planned by the planned readmissions algorithm are not counted as

readmissions. The planned readmission algorithm is a set of criteria for classifying readmissions and planned among the general Medicare population using Medicare administrative claims data. The algorithm identified admissions that are typically planned and may occur within 30 days of discharge from the hospital.

The planned readmission algorithm has three fundamental principles:

A few specific, limited types of care are always considered planned (transplant surgery, maintenance chemotherapy/immunotherapy, rehabilitation);
Otherwise, a planned readmission is defined as a non-acute readmission for a scheduled procedure; and
Admissions for acute illness or for complications of care are never planned

The planned readmission algorithm uses a flow chart and four tables of specific procedure categories and discharge diagnosis categories to classify readmissions as planned. The flow chart and tables are available in the *2017 Condition-specific Measures Updates and Specifications Report: Hospital-Level 30-Day Risk-Standardized Readmission Measures* .

Numerator Search Strategy

Institutionalization

Data Source

Administrative clinical data

Type of Health State

Proxy for Outcome

Instruments Used and/or Associated with the Measure

Planned Readmission Algorithm Version 4.0 (ICD-10) Flowchart

Computation of the Measure

Measure Specifies Disaggregation

Does not apply to this measure

Scoring

Rate/Proportion

Interpretation of Score

Desired value is a lower score

Allowance for Patient or Population Factors

not defined yet

Description of Allowance for Patient or Population Factors

Risk-Adjustment Variables

In order to account for differences in case mix among hospitals, the measure adjusts for variables (for example, age, comorbid diseases, and indicators of patient frailty) that are clinically relevant and have relationships with the outcome. For each patient, risk-adjustment variables are obtained from inpatient, outpatient, and physician Medicare administrative claims data extending 12 months prior to, and including, the index admission.

The measure adjusts for case mix differences among hospitals based on the clinical status of the patient at the time of the index admission. Accordingly, only comorbidities that convey information about the patient at that time or in the 12 months prior, and not complications that arise during the course of the hospitalization, are included in the risk adjustment.

The measure does not adjust for socioeconomic status (SES) because the association between SES and health outcomes can be due, in part, to differences in the quality of health care that groups of patients with varying SES receive. The intent is for the measures to adjust for patient demographic and clinical characteristics while illuminating important quality differences. As part of the National Quality Forum (NQF) endorsement process for this measure, the Centers for Medicare & Medicaid Services (CMS) completed analyses for the two-year Sociodemographic Trial Period. Although univariate analyses found that the patient-level observed (unadjusted) readmission rates are higher for dual-eligible patients (for patients living in lower Agency for Healthcare Research and Quality [AHRQ] SES Index census block groups) and African-American patients compared with all other patients, analyses in the context of a multivariable model demonstrated that the effect size of these variables was small, and that the c-statistics for the models are similar with and without the addition of these variables.

Refer to Appendix D of the original measure documentation for the list of comorbidity risk-adjustment variables and the list of complications that are excluded from risk adjustment if they occur only during the index admission.

Standard of Comparison

not defined yet

Identifying Information

Original Title

Hospital-level 30-day RSRR following COPD.

Measure Collection Name

National Hospital Inpatient Quality Measures

Measure Set Name

Readmission Measures

Submitter

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Developer

Centers for Medicare & Medicaid Services - Federal Government Agency [U.S.]

Yale-New Haven Health Services Corporation/Center for Outcomes Research and Evaluation under contract to Centers for Medicare & Medicaid Services - Academic Affiliated Research Institute

Funding Source(s)

Centers for Medicare & Medicaid Services (CMS)

Composition of the Group that Developed the Measure

This measure was developed by a team of experts:

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Financial Disclosures/Other Potential Conflicts of Interest

None

Endorser

National Quality Forum - None

NQF Number

not defined yet

Date of Endorsement

2016 Dec 9

Measure Initiative(s)

Hospital Compare

Hospital Inpatient Quality Reporting Program

Adaptation

This measure was not adapted from another source.

Date of Most Current Version in NQMC

2017 Mar

Measure Maintenance

Annual

Date of Next Anticipated Revision

2018 Apr

Measure Status

This is the current release of the measure.

This measure updates a previous version: Specifications manual for national hospital inpatient quality measures, version 5.0b. Centers for Medicare & Medicaid Services (CMS), The Joint Commission; Effective 2015 Oct 1. various p.

Measure Availability

Source available from the QualityNet Web site .

Check the QualityNet Web site regularly for the most recent version of the specifications manual and for the applicable dates of discharge.

Companion Documents

The following are available:

Hospital compare: a quality tool provided by Medicare. [internet]. Washington (DC): U.S. Department of Health and Human Services; [accessed 2017 Oct 30]. Available from the Medicare Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 Medicare hospital quality chartbook. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the Centers for Medicare & Medicaid Services (CMS) Web site .

Yale New Haven Health Services Corporation (YNHHSC), Center for Outcomes Research and Evaluation (CORE). 2017 condition-specific readmission measures updates and specifications report: supplemental ICD-10 code lists for use with claims for discharges on or after October 1, 2015. Baltimore (MD): Centers for Medicare & Medicaid Services (CMS); 2017. Available from the QualityNet Web site .

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Production

Source(s)

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